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| AUTHOR | Mauk, Gary W. |
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ABSTRACT

While the commitment to technology for neonatal and infant hearing screening in this country has come a long way and is evolving rapidly, the average age of 18-30 months, at which young children with auditory disabilities are identified, is still unacceptable. The promise of earlier detection, diagnosis, and habilitation of hearing loss is within reach if: (1) there is appropriate understanding of the magnitude and consequences of the problem; (2) information based on past efforts is utilized; (3) there is the ability to evaluate and use emerging technologies appropriately; and (4) collaborative uses of resources and agencies already in place are developed. Appended material includes a public awareness hand-out, a time-line on early identification of hearing loss, a summary of studies on the incidence of hearing impairment in high-risk infants, a draft position statement on universal hearing screening of the Directors of Speech and Hearing Programs in State Health and Welfare Agencies, and suggestions for community/professional advocacy for early identification of hearing loss. Contains 94 references. (Author/DB)

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# Universal Newborn Hearing Screening and School Psychology: Preparing to Serve More Children with Hearing Loss[1]

by

**Gary W. Mauk**
**Center for Persons with Disabilities**
**Utah State University**

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**Universal Newborn Hearing Screening and School Psychology:**

**Preparing to Serve More Children with Hearing Loss**

The identification of hearing loss in newborns and infants is a challenging pursuit (Mahoney, 1989) and numerous studies (e.g., Elssmann, Matkin, & Sabo, 1987; Lyon & Lyon, 1986; Mauk, White, Mortensen, & Behrens, 1991; Stein, Clark, & Kraus, 1983; Stein, Jabaley, Spitz, Stoakley, & McGee, 1990) have reported that the actual ages of identification of hearing loss occurred substantially later than the six months of age recommended by the American Speech-Language-Hearing Association (ASHA), Committee on Infant Hearing (1989). Among the many conditions that warrant the establishment of screening programs to detect disease and possible disability, hearing deficits are most common (Downs, 1978; J. Johnson et al., 1993; Robins, 1990).

Nevertheless, despite this elevated prevalence, screening for auditory function is not routinely included in the assessment series employed in hospital nurseries (Marlowe, 1987). Marlowe (1993) states

> For more than three decades, the urgent need for early screening for hearing impairment has been the rallying point for pediatric audiologists who recognize that good hearing is critical to infants' well-being and development. Although the technology is readily available for effective, efficient screening, most newborns in the United States are not screened for hearing prior to hospital discharge. (p. 22)

Prevalence of Hearing Loss

While severe hearing impairment is thought to be present in about 1 out of every 1,000 normal live births, the prevalence of mild or moderate hearing impairment in the general newborn population is unknown (ASHA, 1989; Hall, 1992). The American Academy of Audiology in its vision/mission statement on screening children for auditory function (cited in Bess & Hall, 1992, Appendix 2), states that

> each year in the United States, about 4,000 children are born deaf or with a profound hearing loss. Approximately 37,000 additional children are born with milder degrees of hearing loss (greater than 35 dB), which can still interfere with development of communication). For almost all of these children, the hearing loss is due to sensorineural (inner ear or auditory cranial nerve) disorders and is permanent....Approximately one million school-age children have hearing loss. In many cases, the hearing loss is congenital and permanent, but for other children of any age the loss is related to recurrent otitis media... (pp. 507-508)

Problems with prevalence statistics. Undoubtedly, the picture of the prevalence of hearing loss is confusing and inadequate, especially in infants. The difficulty of assessing hearing in infants, the strong effects of nonstandard definitions of hearing impairment on prevalence and incidence data which are not standardized, and the fluctuating nature of some hearing losses, and, subsequently, their prevalence all contribute to uncertainty and inaccuracy in reports of prevalence (Riko, Hyde, & Alberti, 1985). Riko et al. (1985)

observed that this uncertainty and inaccuracy are reflected in published figures (see Feinmesser, Tell, & Levi, 1982; Kankkunen, 1982; Martin, 1982; Northern & Downs, 1978; Schein & Delk, 1974). They point out that

> the scale of the early identification problem depends critically on what constitutes significant hearing loss. The prevalence will increase dramatically if criteria below about 25 dB HL are used. Such losses are most difficult to detect by conventional means, and early identification strategies require further detailed studies of the etiology, time course, and development effects of mild, moderate, or unilateral hearing loss. These factors are important because there is increasing concern that children with hearing losses classified as mild are at risk in terms of language development and other aspects of performance. (Riko et al., 1985, p. 137)

Prevalence and education. Most published estimates of the prevalence of hearing loss in the United States (a) make no reference to what proportion of the hearing losses are unilateral versus what proportion of the losses are bilateral and (b) make no distinction among sensorineural, mixed, and conductive losses. Although referring to the prevalence of hearing impairment among children between the ages of five and 18 (the "school-age" population), Davis (1988) makes several points that can apply children younger than age five. He states

> Published estimates tend to vary widely, probably because different criteria for hearing loss are used by different investigators. If mild unilateral or conductive losses are included, the numbers tend to be high. If only

permanent, bilateral hearing losses are included, estimates will be significantly lower. Unfortunately, criteria are not given for most of the estimates that appear in the popular press, and careful demographic studies of the population have not been published. (p. 402)

The American Speech-Language-Hearing Association (ASHA; 1993), in its *Guidelines for Audiology Services in the Schools* states that

> Sensorineural hearing loss is caused by a variety of illnesses and conditions. It is usually permanent and has a total incidence of at least 10 per 1,000 students. It has been estimated that there are seven times as many students with mild to moderate sensorineural hearing losses as with severe to profound sensorineural hearing losses. Many of these mild to moderate losses are not identified until school entry, and the impact of these losses is often not understood. (pp. 25-26).

Ross (1991) succinctly states that, "The incidence of educationally significant hearing losses is not quite as low as has been believed. We know that children with minimal, fluctuating, and unilateral hearing losses display a higher incidence of linguistic and educational problems than children with perfectly normal hearing" (p. 408). Regarding unilateral SNHL in particular, Brookhauser, Worthington, and Kelly (1991) point out that

> Unilateral sensorineural hearing loss (USNHL) in children has traditionally been regarded as developmentally innocuous if appropriate compensatory strategies, such as preferential classroom seating, are implemented early and consistently. Reports in the last decade, however, suggest that early onset,

> severe USNHL may be associated with significant deficits in auditory and psycholinguistic skills and school performance....No reliable prevalence data [on USNHL] are available for infants and preschoolers. Unilateral losses are usually discovered much later in life than bilateral impairments, with most not being identified until entry into elementary school or later....Based on the findings of the present study and previous reports, otherwise normal children with unilateral sensorineural hearing loss appear to have a higher likelihood of experiencing academic difficulty and manifesting school behavior problems than comparable children with normal binaural hearing. (pp. 1264, 1271)

**A Brief Review of the Consequences of Delay in Identification of Hearing Loss**

Although the negative consequences of severe or worse bilateral sensorineural hearing loss have long been recognized, it has only been in recent years that we have realized the damaging consequences of mild bilateral and unilateral sensorineural hearing loss, or conductive hearing loss (American Academy of Audiology, 1988). The consequences of each type of hearing loss are summarized briefly in this section.

Bilateral sensorineural hearing loss. The negative consequences of bilateral sensorineural hearing loss include cognitive, perceptual, speech, language, and academic factors (de Villiers, 1992; Ross, 1990). Furthermore, evidence from recent auditory deprivation research (Markides, 1986; Ramkalawan & Davis, 1992) indicates that the earlier identification and habilitation occur, the greater the level of speech production and linguistic competence achieved by children during their early years of life.

The principal catalysts in the quest for earlier identification of hearing loss are the benefit to the child of maximum intervention at critical learning times and the frightening consequences of ignoring or delaying identification (Garrity & Mengle, 1983). For example, a study conducted at the Lexington School for the Deaf (Greenstein, Greenstein, McConville, & Stellini, 1976) demonstrated that hearing-impaired infants whose hearing-habilitative training was begun prior to 16 months of age had superior speech and expressive and receptive language skills (approximately four months ahead) by three or four years of age when compared with infants whose training was begun after 16 months of age. This study also demonstrated that given similar degrees of hearing loss, the earlier identification is made, the better the language skill. Similar findings regarding the development of speech and language skills have been reported by Edwards (1968), Madell (1988), Paul and Quigley (1987), Quigley (1978), and Tervoort (1965). Further, Phillips (1981) reported children with sensorineural hearing loss who participated in early intervention programs beginning before three years of age demonstrated significant improvement in speech skills and improvement in personal-social, hearing and speech, and performance skills, as well as mother-child communication. The children who took part in early intervention programs also evidenced near-normal achievement in spoken language, social skills, academic skills, reading, and speech.

Although the negative consequences of severe to profound hearing loss have long been recognized, researchers have recently shown that early identification and habilitation are also critical for those with mild or moderate sensorineural hearing losses. In a review of selected language and learning studies, Matkin (1986) concluded that "Even mild sensorineural

hearing losses create significant deficits" (p. 8). Similarly, Bullerdeick (1987) noted that "Research is challenging--and changing--the old assumption that minimal hearing loss in children is innocuous" (p. 904).

Unilateral sensorineural hearing loss. The potential impact of unilateral sensorineural hearing loss is frequently misunderstood and should not be underestimated (Gjerdingen, 1992). Historically, it has been thought that unilateral hearing loss is not a disabling condition for children (Northern & Downs, 1978; Oyler, Oyler, & Matkin, 1987). However, Bess and Tharpe (1984) point out that experimental evidence supporting this widespread clinical impression of the benign nature of unilateral hearing loss is almost nonexistent. Furthermore, recent research demonstrates the serious negative consequences of unilateral hearing loss in areas of auditory and psycholinguistic skills, educational progress (Bess & Tharpe, 1984, 1986; Bovo et al., 1988; Oyler et al., 1987), communication, and classroom behavior (Culbertson & Gilbert, 1986; Stein, 1983).

For example, with regard to academic failure, Bess and Tharpe (1986) found that 35% of children with unilateral hearing losses had repeated a grade, in contrast to a normal failure rate of about 3-1/2%. Klee and Davis-Dansky (1986) found that 32% of children with unilateral hearing losses failed a grade in school, while none of the children in the matched normal-hearing group failed. Oyler, Oyler, and Matkin (1988) reported similar rates of grade retention among children with unilateral hearing losses in their research and noted that the chance of repeating a grade was 10 times greater for children with a unilateral hearing loss than for the general school population. Further exacerbating the problem is the fact that, according to Bess, Klee, and Culbertson (1986), ". . . many of our current

approaches to screening neonates and infants are insensitive to unilateral hearing loss" (p. 43).

Conductive hearing loss. Conductive hearing losses are those due to mechanical blockage in the outer and middle ear that impedes the flow of acoustic or mechanical energy. The most prevalent conductive pathology in infants and children is otitis media (OM; Hodgson & Matkin, 1985). In contrast to sensorineural hearing impairment, conductive hearing impairment is rarely present from birth and is not present continuously; hence, it is often called "fluctuating conductive hearing loss." Although conductive hearing loss is most often of a fluctuating nature, recent evidence indicates that the periodic hearing loss associated with OM may have long-term effects on the language and intellectual development of the child (Feagans, 1986, 1992).

One example is a well-designed study by Teele et al. (1990) in which 207 children were followed prospectively from birth until age seven years. The study revealed that children who experienced OM during infancy were significantly worse than their disease-free peers at age seven in school achievement, speech, and language. (For further discussion of the negative consequences of conductive hearing loss, see Maxon, White, Vohr, & Behrens, 1993).

## UNIVERSAL NEWBORN HEARING SCREENING:

## GATEWAY TO EARLY INTERVENTION

Paraphrasing psychologist Helmer Myklebust (1960), Matkin (1986) observed that, "At some basic level, hearing is the one sense that keeps us in touch with our environment at all times, even in our sleep" (p. 3). The earlier that hearing impairment occurs in the child's life, the more serious the effects on the individual child's development. Similarly, the earlier the hearing loss is identified and intervention initiated, the less serious the ultimate developmental impact (ASHA, 1993).

Many early impairments, such as hearing loss, and deficits in the ability to communicate (i.e., to have an effective language system) hold substantial morbidity for the individual economically and socially and for society in its productivity and socialization (Baumeister, 1992; Moore, 1991; Robins, 1990; Ruben, 1992). Any mild, moderate, or severe hearing loss in infancy can have a severe effect on the development of speech and language (Fritsch & Sommer, 1991; Matkin, 1986; Ramkalawan & Davis, 1992). As such, early detection, diagnosis, and habilitation of the hearing loss are crucial to prevent severe developmental delays in speech and language. Maxon and Brackett (1992) observe that, over the past decade it has been demonstrated that children with "...hearing levels between 20 dB and 40 dB HL (either conductive or sensorineural...[and] unilateral hearing loss will exhibit long-term effects from their hearing impairments" (p. 146).

Pediatrician Robert Ruben (1991) has written that, "There are children in the industrial world who have linguistic deficiencies and subsequent economic and social disadvantage because they were not identified at the optimal time as having a hearing

impairment. The reason for this deficiency does not lie in the technical ability to diagnose or to effectively intervene in the case of a child with a hearing loss. The defect appears to be in the health delivery system which may produce, in a timely fashion, only about half of the hearing impaired children for diagnosis and intervention" (pp. 127-131).

Further, child development research has established that the rate of human learning and development is most rapid during the early childhood or "preschool years" (Caplan & Caplan, 1983). Robins (1990) writes that "the timing of diagnosis and treatment in hearing-impaired children becomes particularly important, since these children run the risk of missing an opportunity to learn during a state of readiness. If advantage is not taken of this critical developmental period, a child may have difficulty learning a particular skill at a later time" (p. 25). Additionally, Ross (1990) has stated that "time is not a benign force for hearing impaired children" (p. 72). Thus, the principal catalyst in the quest for earlier identification of hearing loss is the benefit to the child of maximum intervention at critical learning times and the frightening consequences of ignoring or delaying identification (Garrity & Mengle, 1983).

Pièce de Résistance: Evoked Otoacoustic Emissions and Universal Neonatal Hearing Screening

In 1990, Marion Downs argued that "We must continue to demand that *all children be screened for hearing loss at birth and thereafter, that they are given prompt follow-up and appropriate remediation*" (Downs, 1990, p. 411, italics added). On March 3, 1993, at a press conference following a three-day NIH Consensus Development Conference on "Early Identification of Hearing Impairment in Infants and Young Children" (sponsored by the

National Institute on Deafness and Other Communication Disorders and the NIH Office of Medical Applications of Research and co-sponsored by the National Institute of Child Health and Human Development and the National Institute of Neurological Disorders and Stroke), the 15-member consensus development panel made history by recommending that universal newborn hearing screening be implemented as soon as possible in the United States (National Institutes of Health,, 1993). Additionally, the panel recommended that newborns should be screened before leaving the hospital first with a test that measures evoked otoacoustic emissions (EOAEs) and, if they fail the EOAE screen, should be screened with auditory brainstem audiometry (ABR). A major reason behind this recommendation was convincing evidence provided in a recent issue of Seminars in Hearing on the Rhode Island Hearing Assessment Project (RIHAP) at Women and Infants Hospital in Providence, Rhode Island (see White & Behrens, 1993). But just what are EOAEs and why use them as a first screen for hearing loss?

Description. Transient evoked otoacoustic emissions (TEOAEs), which are frequency dispersive responses emitted by the cochlea in response to brief acoustic stimuli (such as clicks or tone pips), were first recognized by Kemp (1978). Although the process by which TEOAEs are emitted is not completely understood, it is believed that TEOAEs are "caused by the biophysical reaction of outer hair cells to excitory vibration of their stereocilia, or the impact that this reaction has on basilar membrane vibrational properties . . . . The creation of TEOAEs by the cochlea and the re-emission of this energy as sound from the ear serves no important physiological purpose that we can determine, except perhaps to dump surplus biomechanical energy production" (Kemp & Ryan, 1993, p. 31).

The measurement of TEOAEs assesses one of the preneural components of the auditory pathway, and depends on the following mechanism. As sound enters the ear canal, it moves through the middle ear into the cochlea, where thousands of tiny frequency-specific hair cells vibrate in a wave to enable the transmission of the sound signal through the VIII cranial nerve to the brain. Kemp's work showed that these hair cells simultaneously emit sound or an "echo," called the otoacoustic emission, back through the middle ear. This "echo" can be recorded in the external ear canal using a small microphone.

The ease with which EOAEs can be measured led to the development of one commercial device that is presently available for measuring evoked otoacoustic emissions (Kemp, Bray, Alexander, & Brown, 1986). The Otodynamic Analyzer (ILO88) utilizes the EOAE to identify impaired hearing primarily in infants and young children. The ILO88 uses the TEOAE technique. An expanding body of research with infants and adults has demonstrated the value and accuracy of EOAEs in identifying hearing losses (Bonfils, Uziel, & Pujol, 1988a,b; Elberling, Parbo, Johnsen, & Bagi, 1985; Johnsen, Bagi, & Elberling, 1983; Kemp, 1978, 1988; Kemp, Bray, Alexander, & Brown, 1986; Lutman, Mason, Sheppard, & Gibbin, 1989; White & Behrens, 1993).

Probst, Lonsbury-Martin, & Martin (1991) in their review of the literature on the use of TEOAEs with infants stated that "TEOAEs may represent an ideal means for screening hearing and infants compose the primary subject group in which such objective testing is most desirable" (p. 2049). Child screening versions of TEOAE (Cope & Lutman, 1988) show considerable promise of adaptation to the premature population, without excessive loss of sensitivity or specificity (Haggard, 1990). Stevens et al. (1989, 1990) suggest that a

sensitive screen with EOAE, followed by the more specific contingent sifting by simplified ABR procedures on the failing cases, would be optimal, and this deserves evaluation on very large numbers. Further, ABR testing could be combined with aural-immittance audiometry, or conditioned behavioral response audiometry as part of a follow-up strategy (Probst et al., 1991). Epstein and Reilly (1989) state in more specific terms that, "Children with newly identified SNHL should have audiograms every three months during the first year, every 6 months during their preschool years, and at least once a year while in school" (p. 1516).

Prior to the inception of RIHAP, in February, 1990, EOAEs had not been used in the United States in a large-scale neonatal hearing screening program to determine whether such an application is feasible, produces valid results, and is cost-efficient. RIHAP has provided the basis for such an evaluation:

(a) Feasibility -- The results of RIHAP demonstrate that hospital-based universal newborn hearing screening using EOAE is feasible. Hearing screening of every live birth with EOAE can be incorporated into standard hospital practice and results in the identification of many more children with hearing loss than current prevalence rates would suggest. At present all live births at Women and Infants Hospital in Providence are screened with the TEOAE technique (approximately 750 births per month);

(b) Validity -- The results of the RIHAP demonstrate that the EOAE technique is accurate in identifying infants with SNHL (approximately 6 per 1,000 births). Furthermore, EOAE has the added technical advantage of being able to identify a substantial number of infants who will develop persistent fluctuating conductive hearing losses (approximately 20

per 1,000 births). Thus, TEOAE can be dramatically successful in reducing the average age of identification for children with hearing loss.

(c) Cost-efficiency -- Because the EOAE screening is relatively inexpensive, it is an economically viable technique to use in universal newborn hearing screening. A detailed cost analysis of the screening program (including all personnel, fringe benefits, indirect costs, equipment, and supplies) reveals that the screening program can be done for about $25 per. Because the cost was so reasonable and the results of screening so beneficial, Rhode Island recently passed legislation requiring all health insurers in the state to reimburse the costs of newborn hearing screening for all infants born in the state.

Kemp and Ryan (1993) state that, "Clearly, we have reached the point where the usefulness of OAEs as a universal newborn hearing-screening tool is no longer debatable" (p. 43). The results of the systematic evaluation of the TEOAE method as a universal newborn hearing screening technique by RIHAP provide convincing evidence that the goal set for the year 2000 by the U.S. Department of Health and Human Services (1990) to "reduce the average age at which children with significant hearing impairment are identified to no more than 12 months" is achievable. The data and practical experience of RIHAP also provide additional information upon which successful neonatal hearing screening programs can be planned and implemented.

## SETTING THE STAGE:

## EARLY INTERVENTION FOR YOUNG CHILDREN WITH HEARING LOSS

Delayed identification of hearing loss can negatively impact cognitive, emotional, and social development and can leave the child experientially disadvantaged and ill-equipped for the world of school, and later, of work. "Every child in America needs an excellent education --- because global competition demands a highly skilled and knowledgeable work force, because democracy in the modern era depends on a thoughtful and well-educated citizenry, and because knowledge and a love of learning are among the most precious gifts society can give to children. For all these reasons, every child must enter school *ready to learn*..." (National Commission on Children (NCC), 1991, p. 177, italics added). The Children's Defense Fund recently echoed this sentiment when it made as the first of its recommendations for children's education that children be "ready to learn" upon school entry: "To ensure that all children reach school ready to learn....Comprehensive health care [provided by states and communities] ensures that children do not start school at a disadvantage due to preventable illness or disability, such as...hearing loss" (Children's Defense Fund, 1992, p. 47).

Early intervention may be described as "the provision of educational, therapeutic, preventive, and supportive services for young children with disabilities and their families" (Bailey, 1992, p. 385). Currently, the opportunity exists to identify hearing loss at an early age, to establish high-quality services for young children with hearing losses, and to set the stage for future progress. Epstein and Reilly (1989) state that, "All children with SNHL must be started on a comprehensive and well-planned education program" (p. 1516).

However, J. Johnson et al. (1993) observe that

> Although there is a professional consensus that early identification of hearing disability is crucial to the optimization of a child's potential, there are very few examples of successful statewide systems that provide both early identification and appropriate early intervention services that children need to mitigate the deleterious effects of the hearing disability. (p. 116)

Recent federal legislation in the form of Public Law 99-457 (now P.L. 102-119) has established financial incentives to encourage states to implement comprehensive early intervention services for children with special needs (possessing "developmental delays" or "at-risk for developmental delays") from birth through two years of age (Moore, 1991). Additionally, the recently revised Joint Committee on Infant Hearing Position Statement (1991) makes specific reference to Public Law 99-457 as one reason for revision of the 1982 high-risk criteria for hearing loss.

Although Public Law 99-457 requires all state departments of education to be integrally involved in providing services to children with hearing impairments, in a telephone survey of department of education officials in those 16 states, J. Johnson et al. (1993) found only six states (38%) in which the officials were even aware that there was a mandate in their own state to conduct newborn hearing screening.

With regard to the actual provision of services to young children identified as having hearing impairments, the glass is only half full. Most children with severe to profound bilateral SNHL receive fairly good services, but those with less severe bilateral sensorineural hearing losses, unilateral SNHL, or conductive hearing losses usually do not receive adequate

services of the type described by Brackett, Maxon, and Blackwell (1993) until they enter school, if even then. Blake and Hall (1990) note that even in those states with legislative mandates, a system for identification and referral is lacking.

Aside from the need to acquire accurate determinations of children's hearing thresholds, however, MacCarthy and Connell (1984) point out that, for individual children

> ...the educational implications of any hearing loss need to be considered in their own right. Two children with identical audiograms may in fact suffer very different degrees of educational disadvantage. Factors such as the child's general intellectual ability, willingness to persevere, resistance to distraction, parental support and help from teachers can all be very important in determining whether a hearing loss handicaps a child. Unfortunately, the recognition of this relationship between audiological and educational criteria is not always sufficiently recognised [sic]. (p. 82)

Although passage of public policies, both state and federal, have helped to assure that education and rehabilitation opportunities are available to children with sundry disabilities, access to these services remains problematic. With specific regard to children with hearing losses, Davis (1990) argues that they are our "forgotten children." That is, "there is very little sensitivity in our educational system or in society to their plight; often, they fall between the cracks" (Rittenhouse & Dancer, 1992, p. 15). Rittenhouse and Dancer (1992) further assert that, in their view, education and rehabilitation of persons with hearing loss must be view as a lifespan process, "with each component of the process affecting that which

comes before and that which comes after" (p. 15). In reference to the realm of neonatal hearing screening, they sagaciously note the following: "Certainly, today's 'forgotten' school children with hearing loss were preceded by yesterday's 'forgotten' newborns" (Rittenhouse & Dancer, 1992, p. 15).

Critical components. As demonstrated by experiences in the states of Hawaii and Rhode Island, where neonatal hearing screening programs using EOAE technology are dovetailed with a network of early intervention services, J. Johnson et al. (1993) note that developing a successful statewide newborn hearing screening program requires at least seven critical components: (1) documenting the need; (2) generating constituency support; (3) securing legislation; (4) implementing the program; (5) refining the early intervention services system; (6) financing the system; and (7) identifying gaps in the system. J. Johnson et al. (1993) assert that "By following this plan, states committed to development of a comprehensive system for early identification of hearing disabilities would reduce substantially the average age at which children in the United States are identified and enrolled in early intervention services" (p. 117).

As a complement these seven critical components for a statewide newborn hearing screening program, Bailey and Wolery (1992) have delineated seven goals which have emerged as relevant for early intervention: (a) supporting families in achieving their own goals; (b) promoting child engagement, independence, and mastery; (c) promoting development in important domains; (d) building and supporting social competence; (e) facilitating the use of generalized skills; (f) providing and preparing for normalized life experiences; and (g) preventing the emergence of future problems or disabilities. Bailey

(1992) points out that the question, "Is early intervention effective for children with hearing loss?" can only be answered after determination is made of the goals for early intervention with this population. For those individuals engaged in the campaign to identify and provide services to children with hearing losses at an early age, the foregoing seven goals "represent an extraordinarily broad mandate for early intervention and constitute perhaps the most important issue facing early intervention professionals today: Why are we here, and what do we want to achieve as a result of these services?" (Bailey, 1992, p. 390).

Intervention issues created by universal hearing screening. Early intervention programs established and designed for young children with hearing losses typically focus only on those children with severe and profound hearing losses. Yet, universal neonatal hearing screening with the EOAE technique provides a quick, reliable, valid, and cost-efficient method for identifying increased numbers of children with hearing loss of any degree, type, or configuration (Brackett et al., 1993; White et al., 1993). The resultant increase in the number of referrals to early intervention programs for children with hearing losses creates a number of intervention issues which need to be addressed. Among these issues are appropriate assessment and intervention in the audiological, medical, and communication domains (see Brackett et al., 1993 for a detailed discussion of specific considerations in early intervention for children referred from a universal newborn hearing screening program).

## CARPE DIEM: EARLY IDENTIFICATION/EARLY INTERVENTION

MacCarthy and Connell (1984) assert that, "...because of its central position in development, the early identification of hearing loss is essential" (p. 85). The seeds of educational success are sown in the early years of life and the ability to hear effectively is vital to optimum developmental growth. The challenge of early identification, diagnosis, and habilitation of hearing loss in children, whether the loss is unilateral or bilateral, sensorineural, mixed or conductive, or mild, moderate, severe, or profound, is a critical one. Identification of hearing loss at such an early age and initiation of habilitative management as indicated by the screening outcome minimizes the auditory deprivation which can interfere with speech, language, intellectual, and social development and offers the promise of significant favorable economic impact to both the individual and society.

As Barbara Bowman, Director of Graduate Studies at the Erikson Institute for Early Childhood Education in Chicago states, "The money spent in early childhood, the years between birth and eight or nine, will all come back in savings on education, on social services, on special education, on career development, in a variety of ways" (cited in NCC, 1991, p. 187). Monies invested in early auditory screening, ideally at birth, will help to ensure early identification of hearing loss and, as such, will go a long way in preventing the emergence of developmental delays and in preparing each child optimally to be ready to learn. While adequate hearing alone does not determine an individual child's level academic attainment and general societal contribution, it does endow the child with enhanced opportunities to maximize his or her abilities in an increasingly varied and competitive society and validates the child's "right to become" (Marlowe, 1987, p. 339).

Addressing the need for earlier detection and habilitation of hearing loss, Ross (1990) declared that

> There are many things we cannot do for children with congenital sensorineural hearing losses. We cannot improve their physiological hearing acuity. We cannot as clinicians (though perhaps as citizens) improve a child's socioeconomic or intellectual status. What we can do is develop an improved method to detect the hearing loss of hearing impaired children within the first year of life, and ensure that appropriate management is provided, for both the parents and the children. (p. 77)

However, despite advances in early identification of hearing loss, without adequate follow-up services, hearing screening programs will continue to fall short of the objective of identifying all significant hearing losses before 12 months of age. In fact, without aggressive follow-up, the initiation of a hearing screening program is indefensible (Jacobson, 1990). To provide the intervention and management strategies necessary to enable children with significant SNHL to make optimal developmental progress, a combination of strategies is needed including effective neonatal hearing screening based on sound and effective technology and criteria, parent education and involvement, appropriate diagnostic testing, aggressive follow-up, and education of health care professionals. Attention to such strategies would substantially reduce the average age at which children in the United States with significant SNHL are identified.

Clearly, in order for a universal newborn hearing screening to be successful, "multidisciplinary cooperation and persistence across multiple agencies" (p. 55) is needed. Rittenhouse and Dancer (1992) write that

> As professionals interested in helping persons with hearing loss, we must often remind one another to think beyond our own focused discipline if we are ever to provide complementary and collaborative services...Our ability to cooperate, whether it be multi-, inter-, or trans-disciplinary, is critical to the ultimate success of all of our programs and services, regardless of where these services begin within the lifespan of any individual. Successful cooperation and collaboration among professionals and consumers, including parents, family members, and self-help organizations will ultimately create a bond so strong that no one with hearing loss, regardless of life's circumstances, will fall between the cracks and be forgotten. Building coalitions between professionals and professional groups and between consumers and consumer groups is no easy task, but the advantages are many. (pp. 15-16)

## THE POLITICS OF EARLY SCREENING FOR HEARING LOSS

Although hearing screening of every live birth in the U.S. has been recommended by the National Institutes of Health, this is but the first, although important, step on a long journey. Mahoney and Eichwald (1987) stated that "We must convince politicians and administrators that the early identification of hearing loss is a legitimate public health priority" (p. 157). In addition, Bess and Hall (1992) have observed that "it appears that those of us in hearing health care have convinced ourselves of the necessity for early identification, however, we have not yet convinced those groups that are in positions to influence public policy" (p. ix).

Early identification efforts, being proactive, generally require social and political action. Toward this end, Baumeister (1992) and Long (1992) both have recently offered various recommendations for ways in which citizens and professionals can impact human public service policies, especially those which involve early screening to identify children with hearing impairments and early intervention to mitigate the developmental consequences of auditory dysfunction. [An amalgamation of their views in the form of the acronym "HEARING LOSS" is presented in the Appendix.]

As Neufeld (1991) has written with regard to professional cooperation versus competition regarding advocacy for early identification and intervention with children with disabilities at large,

> It is time to lay aside petty grievances between the public and private sector, various categorical groups and different professional communities that fragment our system. Effective advocacy consists of networks of people and

organizations with common concerns and shared values working together. Without these alliances we will resemble armies of ants competing for the crumbs of public resources while "dinosaurs" in the system divide the loaf....the stakes in planning and providing services to people with special needs are higher than issues such as the location of a facility or the person or professional group that provides a needed service. (pp. 19-20, 22)

These words ring true as well for those individuals and organizations who are engaged specifically in the quest for earlier identification of hearing loss and, consequently, earlier intervention for identified children. Kenworthy (1990) has stated that

> Without early intervention programs in which to place those who are identified, the impetus for early identification may be lost. In the interest of program development and advocacy for children one might assume the alternative view that *only through comprehensive identification will the need for early intervention programs be realized.* (p. 328, italics added).

Barringer, Strong, Blair, Clark, & Watkins (1993) observe astutely that if the goal of the United States is to identify by 12 months of age children who have hearing losses, the goal will not be achieved without an aggressive and committed effort. They offer the following recommendations for professionals in the field:

- *Aggressively educate parents, educators, and medical personnel regarding the dangers of delayed identification of children, as well as the behaviors to observe.*
  - Possible formats for such an educational effort might include, local, regional, and national public-service advertisements

through newspapers, radio, and television and proposals to public and private agencies for development of educational programs for all relevant audiences.

- Professionals working with children who have hearing losses and their families must not depend on the high-risk register or other formal hearing-screening procedures to identify such children. Instead, they must recognize that detection of hearing loss is the responsibility of all individuals who serve children.

▸ *Carefully attend to the research-based literature on EOAE.* Based on the work of the Rhode Island Hearing Assessment Program (RIHAP), EOAE screening has the potential for becoming a successful, universal neonatal hearing-screening procedure...resources should be devoted to its nationwide use.

▸ *Discontinue efforts to implement the high risk register in states that still lack such a system.* Given the few statewide adoptions of high-risk registers over the last 20 years, and the fact that high-risk registers identify at best only half of the children who have hearing losses (e.g., Mauk, White, Mortensen, & Behrens, 1991), emphasis should be placed instead on state-wide screening programs that use EOAE technology.

Barringer et al. (1993) also offer the following suggestions related to professional and parental education:

Professional Education

To educate other professionals and parents, professionals in the field should:

- Personally contact relevant professionals (e.g. family practitioners, pediatricians, ENTs) by telephone, with a follow-up letter outlining their concerns;
- Produce pamphlets that emphasis early identification of children who have hearing losses, and describe the behaviors that signal the presence of hearing loss. Distribute the pamphlets to doctors' offices and to hospitals;
- At professional meetings in their communities, explain the need for early identification of children who have hearing losses; and
- Advocate hearing loss-identification procedures in state and community child-find programs.

Parental Education

- Develop public-service announcements for radio, television, and newspapers explaining the importance of early identification of hearing loss.
- Present information to community service and parent-teacher groups.

## SUMMARY

While the commitment to technology for neonatal and infant hearing screening in this country has come a long way and is evolving rapidly, the average age of 18-30 months, at which young children with auditory disabilities are identified, is still unacceptable. The promise of earlier detection, diagnosis, and habilitation of hearing loss is within reach (a) if we have appropriate understanding of the magnitude and consequences of the problem, (b) if we are able to learn from past efforts, (c) if we are able to evaluate and to use emerging technologies appropriately, and (d) if we are willing to develop collaborative uses of resources and agencies already in place. The present moment offers us an opportunity to use the emerging technology to the benefit of those children with early onset hearing losses. Having recognized for at least 40 years that children with significant hearing loss should be identified and provided with appropriate intervention as early as possible (Mauk & Behrens, 1993), it is time to begin doing something about it. We must begin to screen all children for hearing loss at birth, thereby seizing the moment and setting the stage for optimal developmental, educational, and economic futures for children with hearing losses. School psychologists, as leaders for change, can assist in this important endeavor.

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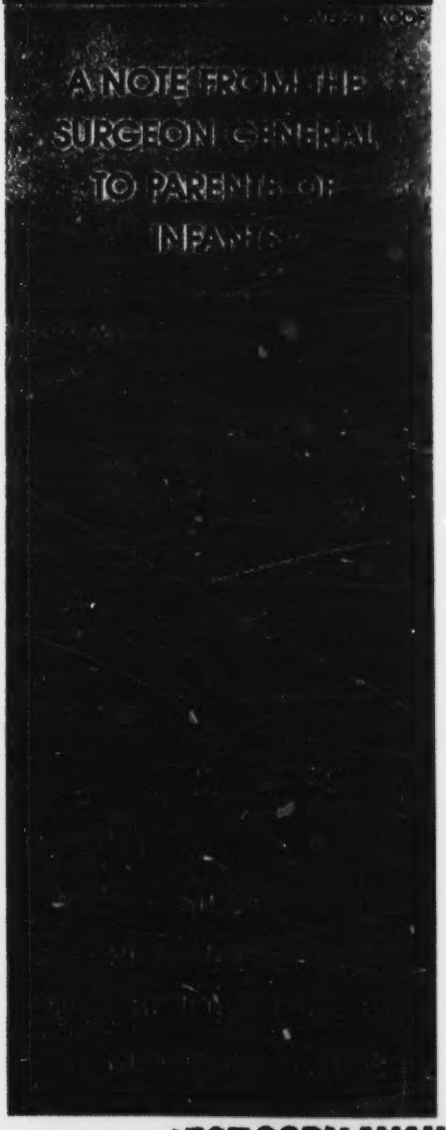
# APPENDIX




# Parents Are The First To Know If Their Infants Cannot Hear.

*When you check your baby's hearing, he/she should be happy and the room quiet.*

## DOES YOUR BABY SOMETIMES:

**By Age Birth to 3 Months**

- Startle or jump when there is a sudden loud sound?
- Stir or wake up and cry when someone talks or makes a noise?
- Recognize and be quieted and sometimes pacified by the sound of your voice?

**By Age 3-6 Months**

- Turn his/her eyes to look for an interesting sound?
- Respond to mother's voice?
- Turn his/her eyes toward you when you call his/her name?

**By Age 6-12 Months**

- Turn toward interesting sound and toward you when his/her name is called from behind? (Sounds need NOT be loud)
- Understand "no" and "bye-bye" and similar common words?
- Search or look around when hearing new sounds?

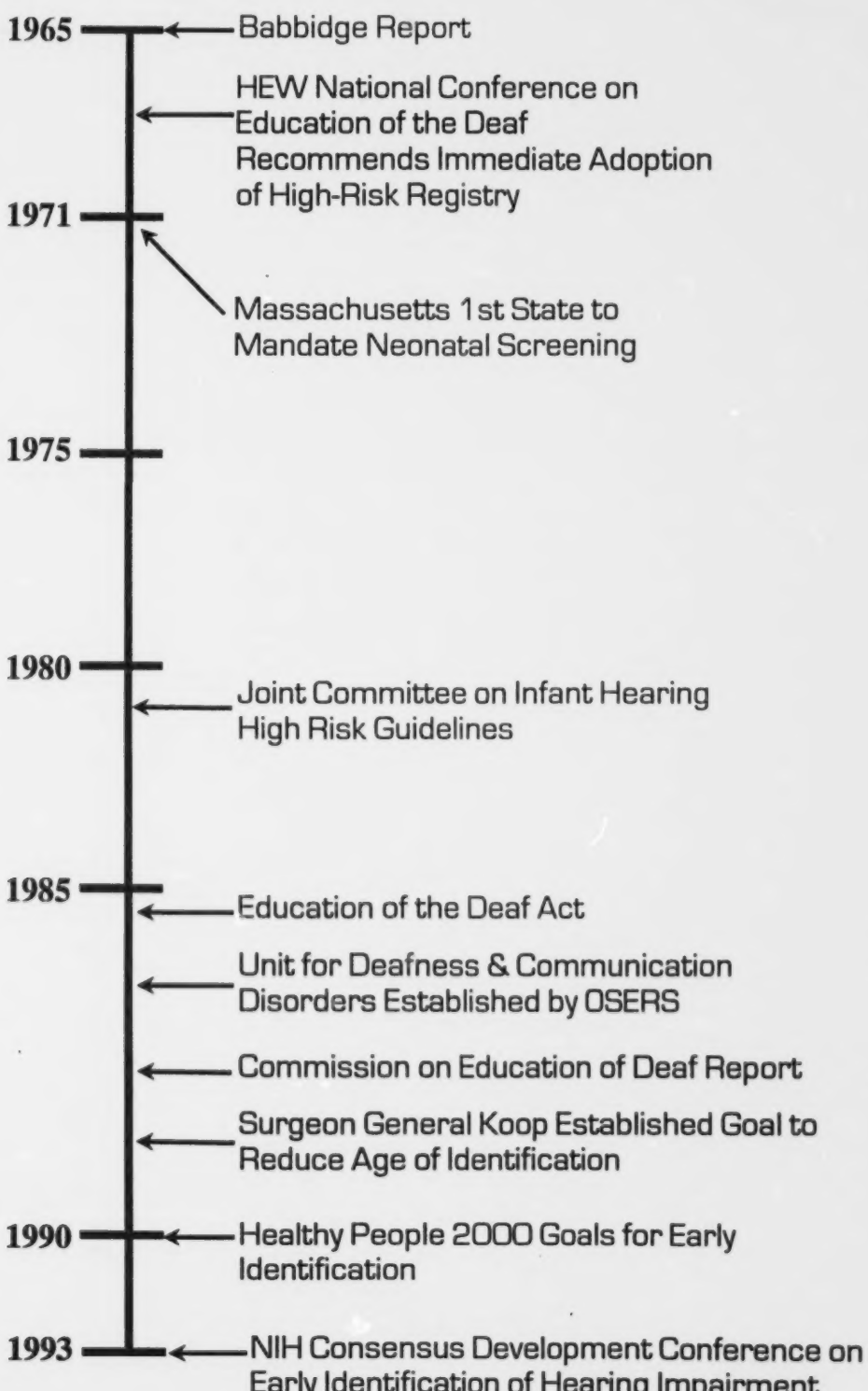
**If your baby cannot do these things, check with your doctor.**

## PARENTS MUST PERSIST UNTIL THEIR CONCERNS ARE ANSWERED!

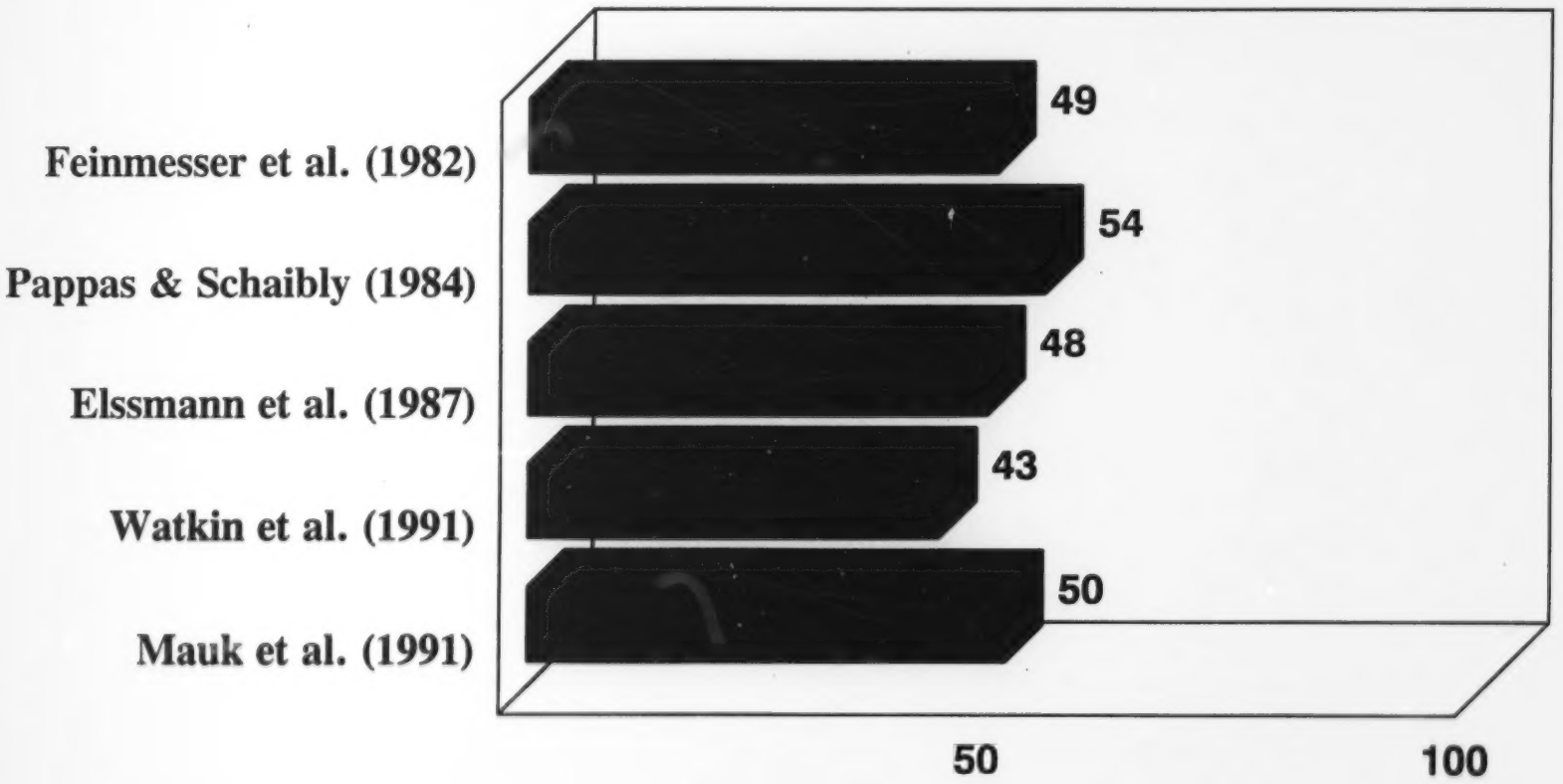
*IF YOU NEED ANY HELP REGARDING YOUR INFANT'S HEARING,*
***CALL THE SURGEON GENERAL'S HOTLINE: 1-800-922-9234***
Please copy and distribute as widely as possible.

BEST COPY AVAILABLE

# Historical Context for Early Identification of Hearing Loss in the United States


1965
Babbidge Report
HEW National Conference on Education of the Deaf Recommends Immediate Adoption of High-Risk Registry
1971
Massachusetts 1st State to Mandate Neonatal Screening
1975
1980
Joint Committee on Infant Hearing High Risk Guidelines
1985
Education of the Deaf Act
Unit for Deafness & Communication Disorders Established by OSERS
Commission on Education of Deaf Report
Surgeon General Koop Established Goal to Reduce Age of Identification
1990
Healthy People 2000 Goals for Early Identification
1993
NIH Consensus Development Conference on Early Identification of Hearing Impairment

# What Percent of Hearing Impaired* Children were High-Risk as Infants?




* Limited to children with permanent bilateral hearing loss ≥ 50 dB HL

## Directors of Speech and Hearing Programs in State Health and Welfare Agencies (DSHPSHWA)

## "Position Statement on Universal Hearing Screening" [November, 1993 -- Draft]

- **The Directors of Speech and Hearing Programs in State Health and Welfare agencies (DSHPSHWA) endorses universal newborn and infant hearing screening as described by the Joint Committee on Infant Hearing 1993 Position Statement and the National Institutes of Health 1993 *Consensus Statement on Early Identification of Hearing Impairment in Infants and Young Children*.**

- **It is well recognized that the early identification of hearing loss is paramount to normal speech/language, psychosocial, academic, and vocational development in children.**

- **The implementation of universal hearing screening will expedite the goal of identification of significant hearing loss by 3 months of age.**

- **Many states at present are using a risk registry which has the potential to identify only up to 50% of hearing impaired infants. This potential is greatly reduced by the fact that there is a significant loss to follow-up in most high risk programs.**

## Directors of Speech and Hearing Programs in State Health and Welfare Agencies (DSHPSHWA)

## "Position Statement on Universal Hearing Screening" [November, 1993 -- Draft]

**continued...**

- **In light of this, DSHPSHWA supports the following:**

1. **All infants should be screened for hearing loss in the first three months of life, preferably prior to hospital discharge.**

2. **It is recommended that at the present time either the auditory brainstem responses (ABR), otoacoustic emissions (OAE) or both be used as a physiologic battery to screen for hearing loss with the consideration of new and improved techniques as they become available.**

3. **The 1993 Joint Committee on Infant Hearing risk indicators should be maintained as an adjunct to universal hearing screening to monitor for late onset hearing loss.**

4. **Appropriate intervention and follow-up, including Part H of the Individuals with Disabilities Education Act (IDEA) needs to be incorporated into universal hearing screening programs.**

## Directors of Speech and Hearing Programs in State Health and Welfare Agencies (DSHPSHWA)

## "Position Statement on Universal Hearing Screening" [November, 1993 -- Draft]

**continued...**

5. **The education of families and other caregivers, primary health care providers, and the general public is an integral part of early identification and follow-up services.**

6. **The financial support for universal hearing screening should be included in the national health care reform.**

7. **A national data base for universal hearing screening needs to be established.**

▸ **It is vitally important that public health agencies take a leadership role in implementing national universal hearing screening. This is consistent with the *Healthy People 2000* goal which specifies that infants with hearing loss be identified by 12 months of age.**

## *Suggestions for Community/Professional Advocacy for Early Identification of Hearing Loss*

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**H**ave a precisely defined consensus of what needs to be changed and what needs to be done by whom, when, and where;

**E**stablish and ongoing system of information exchange among groups with comparable interests and efforts;

**A**ccept the need for compromise;

**R**esist being discouraged and don't give up;

**I**nvestigate possible funding sources for your group's efforts;

**N**ominate two or three well-respected individuals to understand and study the political environment, the "major players," and the obstacles to implementation of your plan or policy;

**G**enerate an action plan that calls for (1) continuous lobbying, (2) coordination among groups that share the common cause; and (3) constant updating of related technical/scientific information;

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## *Suggestions for Community/Professional Advocacy for Early Identification of Hearing Loss*
*[continued]*

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**Locate successful politicians and ask advice (particularly those who, for personal reasons, will be sympathetic to your group's agenda);**

**Organize a media campaign;**

**Speak English, not jargon; and**

**Set realistic targets at intervals, targets that represent a "successive approximations" approach to your ultimate goal.**

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*Developed by Gary W. Mauk, Dept. of Psychology, Utah State University, from the following material:

Baumeister, A. A. (1992). Policy formulation: A real world view. In F. H. Bess & J. W. Hall, III (Eds.), Screening children for auditory function (pp. 111-123). Nashville: Bill Wilkerson Center Press.

Long, B. B. (1992). Developing a constituency for prevention. In M. Kessler, S. E. Goldston, & J. M. Joffe (Eds.), The present and future of prevention (pp. 69-77). Newbury Park, CA: Sage.